

Unit 6: Genetics Study Guide

1. Describe the difference between phenotype and genotype.
2. What is polygenic inheritance?
3. What is incomplete dominance? What is codominance? Provide an example of each.
4. In your own words describe Mendel's laws.
5. If you are a male with hemophilia (a sex linked trait) who did you inherit the hemophilia gene from, mom or dad? How do you know?
6. What are the phases of meiosis?
7. What is the difference between dominant and recessive? How do we represent them?
8. What are alleles?
9. What is the difference between homozygous and heterozygous?
10. What are genes?
11. Who is Mendel and why is he important?
12. How are sex-linked traits different from Mendelian Genetics?
13. How does meiosis make 4 unique daughter cells?
14. If two parents have a dominant trait, can they have a child that has a recessive trait? Explain.
15. If two parents have a recessive trait, can they have a child that has a dominant trait? Explain.
16. The passing of traits from one generation to the next is known as what?
17. What are Punnett squares/ what are they used for?
18. What is crossing over?

In certain species of animals, black fur (B) is dominant over brown fur (b). For 19-21 use a Punnett square to determine the cross and answer questions a-b:

19. Both parents are heterozygous and have black fur.
20. One parent is homozygous black and the other is brown.
21. One parent is heterozygous black and the other is brown.
 - a. What is the genotypic ratio?
 - b. What is the phenotypic ratio?

Use the chart below for problems 22-27

<u>Trait</u>	<u>Dominant allele</u>	<u>Recessive allele</u>
Pod shape	Smooth (N)	Constricted (n)
Pod color	Green (G)	Yellow (g)
Flower position	Axial (A)	Terminal (a)
Plant height	Tall (T)	Short (t)

For each problem below, make a Punnett Square and give the phenotypic and genotypic ratios.

22. $Nn \times NN$
23. $Aa \times aa$
24. Cross a plant that is heterozygous for axial flowers with a plant that has terminal flowers.
25. Cross a plant that is heterozygous for smooth pods with a plant that has constricted pods.

26. When a tall plant is crossed with a short plant, some of the offspring are short. What are the genotypes of the parents and the offspring? What is the phenotypic ratio in the offspring?
27. What cross would result in 1/2 of the offspring having green pods and 1/2 of the offspring having yellow pods?

For 28-29 use a Punnett square to determine the cross if red and white flowers are incompletely dominant. Answer questions a-b for each example:

28. Cross a plant that has red flowers with a plant that has pink flowers:
29. Cross a plant that has pink flowers with a plant that has white flowers:
 - a. What is the genotypic ratio?
 - b. What is the phenotypic ratio?
30. If two parents had the genotypes BbEE and bbEe would like following offspring genotypes be possible? Provide a brief explain why.
 - a. BBEE
 - b. BBee
 - c. bbEE
 - d. BbEe

HONORS ONLY

In a di-hybrid cross, when two traits are considered, the number of possible combinations in the offspring increases. Suppose that brown hair (B) is dominant over blonde hair (b) and brown eyes (E) are dominant over blue eyes (e). Hint: Assume that brown and blue are the only possible eye colors.

For 31-32 use a Punnett square to show the cross and answer questions a-b.

31. The father has black hair (heterozygous) and brown eyes (heterozygous) and the mother has blonde hair and blue eyes.
32. Both parents have brown hair (heterozygous) and brown eyes (heterozygous).
 - a. What is the genotypic ratio?
 - b. What is the phenotypic ratio?

In mice, the ability to run normally is a dominant trait. Mice with this trait are called running mice (R). The recessive trait causes mice to run in circles only. Mice with this trait are called waltzing mice (r). Hair color is also inherited in mice. Black hair (B) is dominant over brown hair (b). For problems 33-34 make a Punnett Square and give the phenotypic and genotypic ratio.

33. Cross a homozygous running, homozygous black mouse with a heterozygous running, brown mouse.
34. Cross a waltzing brown mouse with a waltzing brown mouse.